Government agencies may require periodic laboratory analysis of soils and water throughout the treatment and rehabilitation process. This tactic describes procedures for sampling and analysis of spilled substances in tundra soil, surface water, and subsurface (active layer) water. The Alaska Department of Environmental Conservation must approve sampling and analysis plans. Occupational Safety and Health Administration regulations require special training for sampling hazardous substances such as crude oil, petroleum products, methane, and glycol.

Selection of Sample Sites

To reinforce a correlation between analytical results and field-indicator observations and measurements, use field indicator sampling points (Tactic AM-2) for analytical sampling locations whenever possible or collect field indicator data at analytical sample locations. Avoid collecting analytical samples from areas previously disturbed by field indicator observations.

Sampling frequency is determined by the monitoring schedule and requirements of agencies. An intensive treatment and monitoring program may require ongoing sampling (weekly to monthly), and other less-intense programs may require monitoring only once a year. Sampling is normally performed when the tundra is thawed.

Preventing Cross-Contamination

Avoid cross-contamination of samples by using proper sample-handling techniques and decontamination practices. Use clean sampling equipment and clean, disposable sampling gloves for each sample. Decontaminate sampling equipment before each sampling event to ensure collection of representative samples and to prevent cross-contamination. Use a laboratory-grade detergent and preferably hot potable water to clean sample equipment. Rinse with tap water followed by multiple rinses with de-ionized water.

Soil Sampling Procedures

A cross-section of tundra would show two distinct layers of soil differentiated by color and texture. The upper horizon consists of a dark organic soil that is often smooth in texture, while the lower horizons are often lighter or gleyed mineral soil with a sandy or silty texture.

Collect samples separately for the upper organic horizon and the lower mineral soil horizon. Stainless steel spoons, disposable sample scoops, shovels, and hand augers may be used to collect surface/near-surface samples. All sampling equipment must be decontaminated before each sampling event.

Surface soil samples must be collected from freshly uncovered soil to minimize the loss of any volatile fractions of analytes. A sample must be transferred directly from the freshly uncovered soil to the laboratory-supplied sample container with the sampling equipment (e.g., disposable sample scoop). If the sample is to be collected in a test pit that has been open for longer than one hour, a minimum of 3 inches of soil should be removed immediately before collection.

Surface Water Sampling Procedures

Surface water may be present at or near field-indicator sampling points (Tactic AM-2), and surface water samples should be collected as close to these points as possible. Collect these samples by gently immersing a clean sample bottle in the surface water. Avoid disturbing sediments in the immediate vicinity of the collection point before sample collection.

Field water- quality measurements may be recorded after sample collection, including:

- Temperature
- pH
- Specific conductance
- Dissolved oxygen

Calibrate the instruments in the field before use.

Active-Layer Water Sampling

Well points may be installed for subsurface sampling. Before sampling, wells should be developed by removing five well volumes (calculated from the volume of water inside the well casing) from the well to remove any water or fluids introduced into the well during installation. Before each sampling event, three well casing volumes should be purged from the well point to ensure a representative sample of subsurface water. Develop and purge well points with a disposable bailer or a peristaltic pump. Collect development and purge water in drums and dispose of it according to applicable regulatory guidelines.

Use a sterile, disposable bailer to collect water samples from well points. Immediately place water into sample containers and preserve as specified by the analytical laboratory.

Laboratory Analysis Plan

The type of substance spilled and the sample media dictate the analysis used. Laboratories will provide sample containers and specify required sample quantities.

Example Sampling and Analysis Parameters

SPILLED SUBSTANCES	ANALYSIS	MATRIX	EPA/ADEC METHOD	CONTAINERS (will vary with lab)	PRESERVATION, HOLDING TIME
Crude Oil, Diesel, Gasoline	Gasoline Range Organics (GRO)	Water	AK 101	Glass with Septa/120 ml	HCl to pH<2, Cool to 4°C, extract and analyze in 14 days
		Soil	AK 101	4-oz Amber glass, teflon-lined septa (TLS) lid	Methanol, <25°C, extract and analyze in 28 days
	Diesel Range Organics (DRO)	Water	AK 102	2-1L Glass Amber	pH<2 (HCl), 4°±2°C, 7 days to extract, analyze <40 days
		Soil	AK 102	4-oz Amber glass, TLS lid	4°±2°C, 14 days to extract, analyze <40 days
	Residual Range Organics (RRO)	Water	No Water Method		
		Soil	AK 103	4-oz Amber glass, TLS lid	4°±2°C, 14 days to extract, analyze <40 days
	Total Polynuclear Aromatic Hydrocarbons (PAH)	Water	610	40-ml VOA, TLS lid	pH<2 (HCl) 4°±2°C/14 days
		Soil	8270, 8100, or 8310	4-oz Amber glass, TLS lid	4°±2°C/14 days or per method requirements
	Total Petroleum Hydrocarbons (TPH)	Water	AK 103	Liter amber	HCl pH<2, cool to 4°C, extract and analyze in 14 days
		Soil	AK 103	4-oz jar	4°±2°C/14 days or per method requirements
	Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)	Water	8260M (SIM)/602	Glass with Septa/120 ml	HCl pH<2, cool to 4°C, extract and analyze in 14 days
		Soil	8260M/ 8021B/ 8240/ AK 101	4-oz Amber glass, TLS lid	4°±2°C, extract and analyze in 14 days or per method requirements
Glycol		Water	8100M	40-ml VOA	4°±2°C/7 days or per method requirements
		Soil	8100M	4-oz jar	4°±2°C/7 days or per method requirements
Therminol		Water	8100M	40-ml VOA	4°±2°C/7 days or per method requirements
		Soil	8100M	4-oz jar	4°±2°C/7 days or per method requirements
Methanol		Water	8100M	40-ml VOA	4°±2°C/7 days or per method requirements
		Soil	8260B	4-oz jar	4°±2°C/7 days or per method requirements
Salinity		Water	SM-2520B	250-ml plastic	4°±2°C/14 days or per method requirements
		Soil	SM-2520B	4-oz jar	4°±2°C/14 days or per method requirements

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